

# Optimizing Road Project Timing

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## STAKEHOLDER DOCUMENT:

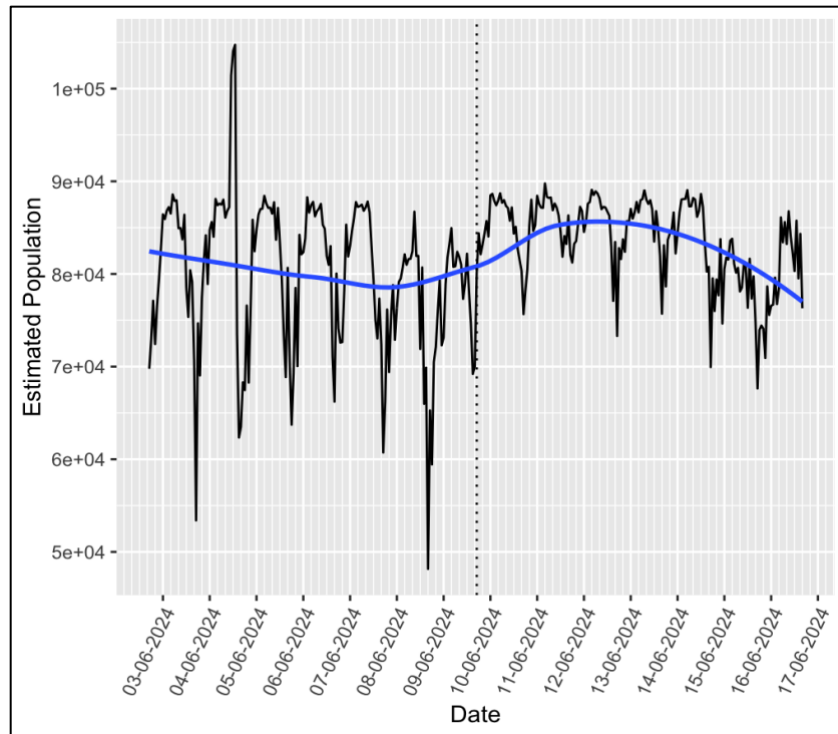
### INTRODUCTION:

The following report provides information that answers the three main questions posed by the Fulton Hogan stakeholders regarding roadworks and population counts in the main CBDs of New Zealand. This information will assist in decision making regarding the timing of roadwork projects. The first question inquires as to whether planning roadworks during school holidays would be beneficial. The second question asks which days of the week are the best to conduct roadworks. The third and final question considers if any notable geographical differences exist between the CBDs that the stakeholders should be made aware of. Using the data collected from Spark Telecommunications and Vodafone, we can confidently answer these inquiries.

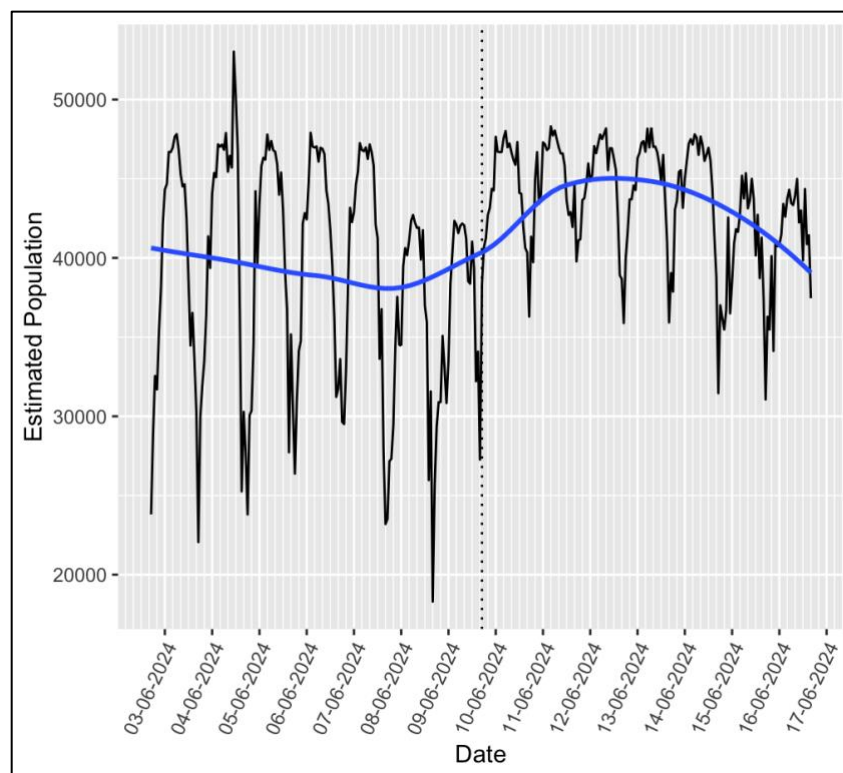
### QUESTION 1:

Does it make sense to plan roadworks for school holidays in CBD areas?

Our analysis does not support a generalised answer to this question. The overall trend of our estimated population counts across the three major CBDs (Auckland, Wellington and Christchurch), presented in Figure 1, indicates a preference for roadworks to be carried out on ‘normal’ weeks, with evidently less people present on the roads. However, further investigation shows that this trend is heavily influenced by the large Auckland population. The estimated population trend for New Zealand’s largest city (Figure 2) essentially mirrors the overall trend, clearly highlighting the inflated road user count during the school holiday week.

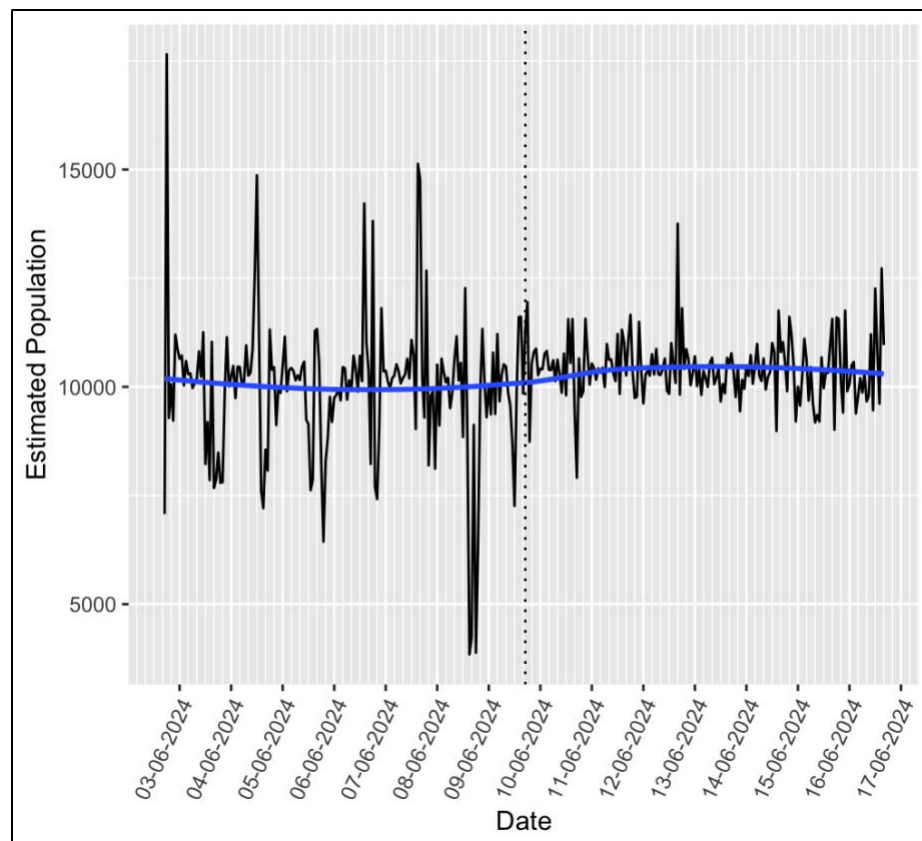


**Figure 1:** Combined major CBD estimated population/road user trend. Left of dotted line is 'normal' week, right is school holiday.



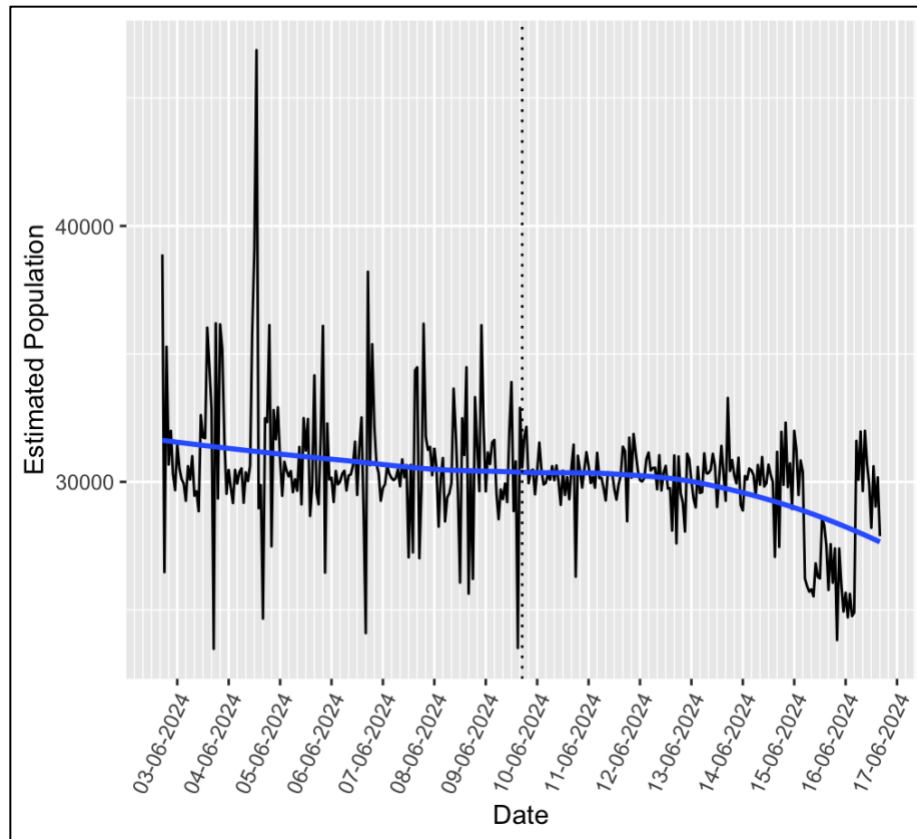
**Figure 2:** Auckland CBD estimated population/road user trend.

However, the Christchurch CBD was found to show minimal variation in estimated road user count between the ‘normal’ and school holiday weeks, as shown in Figure 3. An argument could be made for the preference of roadworks to be carried out during ‘normal’ weeks, like Auckland, due to the slight decrease in road users indicated by the smoothed trend line. We would recommend against this, given the significantly more volatile traffic patterns with anomalous peaks that could cause considerable road congestion. Whilst the overall amount of road users remains mostly unchanged during school holidays, the period exhibits much greater consistency, a benefit to road and traffic management.



**Figure 3:** Christchurch CBD estimated population/road user trend.

The Wellington CBD exhibits a similar estimated population/road user trend to Christchurch, as shown in Figure 4, including a volatile ‘normal’ week and more consistent school holiday period. However, there is a more clear-cut gradient, and therefore, preference for the undertaking of roadworks during school holidays, especially if the work is short-term and able to be carried out over the weekend.



**Figure 4:** Wellington CBD estimated population/road user trend.

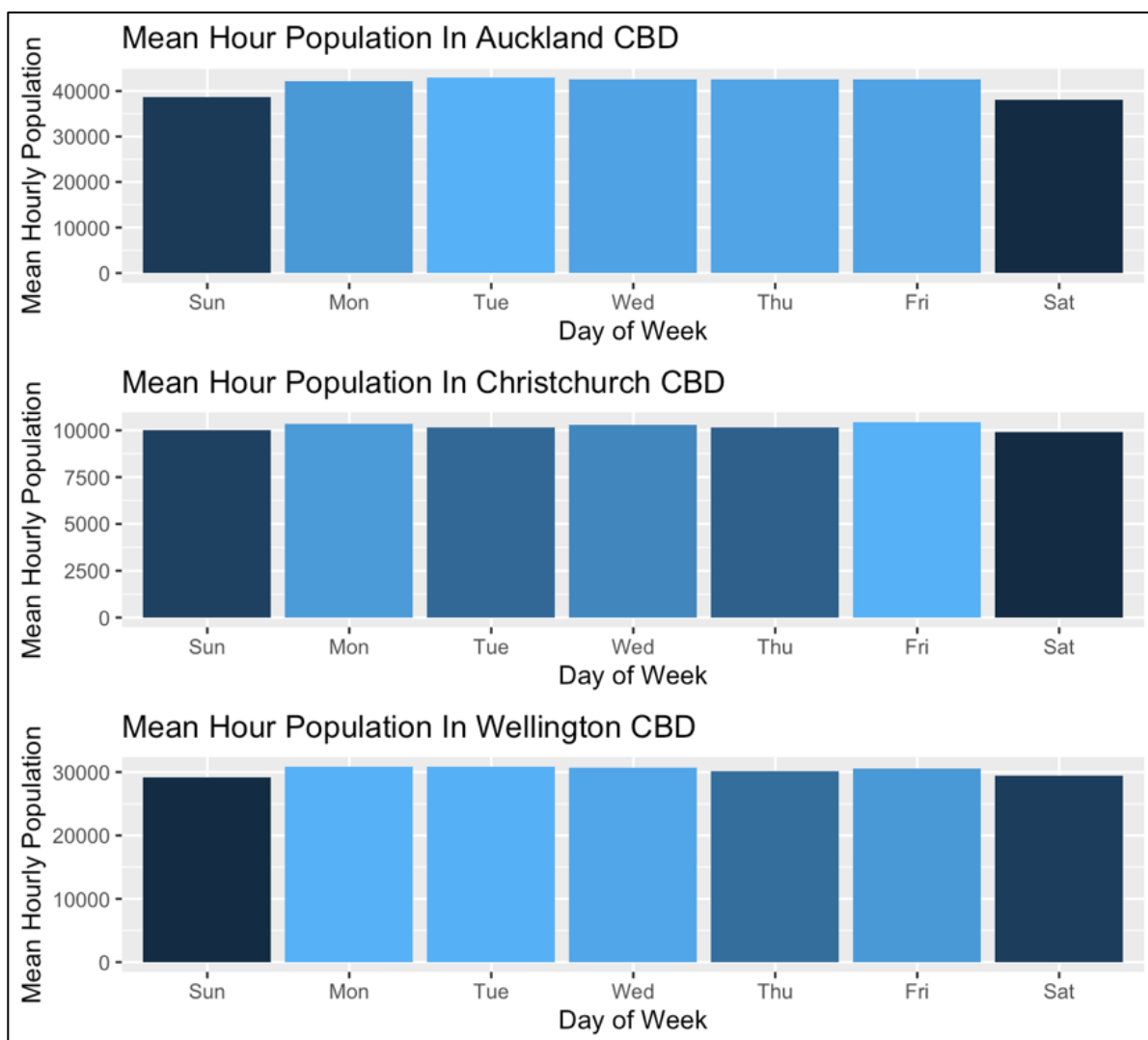
To summarise, the three studied CBDs showed nuances in road traffic that make it difficult to provide a generalised answer as to whether it would be beneficial to plan roadworks for ‘normal’ weeks, or school holidays. Results indicated that it would be preferential for works to be carried out during ‘normal’ weeks in the Auckland CBD, whereas school holidays would be a more appropriate choice for Christchurch and Wellington – though the former is particularly debatable.

## QUESTION 2:

Which days are best if roadworks must be completed during the day?

From our data shown in Figure 5, which shows the mean hourly population per day in each of the CBDs, we can determine that the best days to perform roadworks are Saturday in Auckland and Christchurch and Sunday in Wellington. In all centres either weekend day has significantly less population in all three centres. Therefore, if population density is the only consideration, then the weekends will provide the least disruption.

If weekends aren't possible due to other considerations, the days that are best are different for each centre. In Auckland there isn't a significant difference between any of the days. But there is slightly more population density on Tuesdays and Fridays therefore we'd suggest avoiding those days and choosing Monday, Wednesday or Thursday but overall, there isn't a huge difference. In Christchurch, Thursday is the best day as they have a lower population then the other days, with Tuesday being the second-best option. In Wellington the weekday with the lowest population density is Thursday. This can be seen as the population count for the region is significantly lower on those days. Given the lower population, we can assume that the roads will be less full, and it will be easier to perform the necessary roadworks while causing the least amount of traffic. Overall, out of all the centres Thursday has the lowest population density for weekdays and would be our recommendation for road works if the weekends are not an option.



**Figure 5:** Mean Hourly population by CBD. Darker blue indicates lower population, lighter higher.

### QUESTION 3:

Are there any geographical differences between CBDs we must be aware of?

Auckland is the biggest city of the 3 major cities in New Zealand. Its CBD has the most defined SA2s (17 defined SA2s) compared to Wellington CBD (9) and Christchurch CBD (5).

The topography of CBDs can affect pedestrian movement and public transport in and out of the CBD. The elevation of hills in Auckland and Wellington CBDs can create natural barriers that can impede on pedestrian movement into the city centres. In contrast, Christchurch CBD's flatter topography can enable easier navigation into the city. However, Auckland and Wellington CBDs are well-connected by roads and public transport systems making it easily accessible, improving pedestrian flow in and out of the CBD. They offer train, bus, and ferry public transport systems in and out of the central district, whereas Christchurch relies solely on buses for public transport in and out of the CBD.

Both Auckland and Wellington CBDs are located near waterfronts which support recreational activities and businesses while also providing a transport option into the city centre via ferries, making it more accessible and attractive to pedestrians.

Auckland CBD is a lot denser compared to Christchurch and Wellington, characterised by its numerous skyscrapers, high-rise buildings, and greater population density. In contrast, Christchurch CBD is a lot more open, with an increased integration of green space after the post-earthquake rebuild, enhancing the appeal of the CBD, which can lead to more people visiting the central district area.

## CONCLUSION:

From our data we can answer the three main questions posed by our stakeholders. For the first question of whether it makes sense to plan roadworks during the school holidays, we can conclude that in both Wellington and Christchurch there is a slight benefit to carrying out roadworks during this time. However, in Auckland there is a noticeable increase in the number of people in the CBD, and thus it would be unwise to perform any roadworks during the school holiday. For the second question, it is clearly the best to perform any roadworks during the weekend, probably because most people are at home instead of at work. If the weekends aren't an option, then the second-best solution is Monday in Auckland, Tuesday or Thursday in Christchurch, and Thursday in Wellington. Lastly, we've covered several notable geographical differences in the CBD's. Where Auckland is the largest and the densest of the three and has similar geography to Wellington, Christchurch's flat and open structure poses different challenges to consider. Of course, with the size of the data we cannot be 100% confident of how realistic these conclusions are, and if the trends we see continue through the school holidays.